IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellants:	David R. Payne, Gerald A. Stangl, Norman E. Stevens, Jr., and Michael F. Gard	Group No.:	3671
Serial No.:	10/617,975	Examiner:	Raymond W. Addie
Filed:	July 12, 2003	Att'y Dkt. No.	2380-561
For:	SYSTEM AND METHOD FOR AUTOMATICALLY DRILLING AND BACKREAMING A HORIZONTAL BORE UNDERGROUND	Customer No.:	28839
		Confirmation No.:	4897
		Date:	December 28, 2007

APPELLANTS' BRIEF

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TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest in this application is The Charles Machine Works, Inc. ("CMW"), an Oklahoma corporation having a principal place of business at 1959 W. Fir Avenue, Perry, Oklahoma 73077. CMW is the sole owner by assignment of the instant application.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the instant appeal.

III. STATUS OF CLAIMS

Claims 1-3 are withdrawn.

Claims 4-12 are rejected.

IV. STATUS OF AMENDMENTS

No amendments are outstanding in this application. Appellant understands the claims to read as they did on November 19, 2007, the mailing date of the most recent Office action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 4 of the present invention is directed to a method for automatically backreaming a horizontal borehole. The method comprises automatically rotating and pulling (2002) a drill sting (22) having a backreamer (24) through the horizontal borehole and automatically reducing a length of the drill string (2008). Page 34, lines 5-17. The method also comprises automatically reducing a rate of pullback (2014) if a rotation pressure on the drill string is greater than a predetermined limit (2012). Page 34, lines 18-21. Further, the method comprises automatically reducing the rate of pullback (2026) if a rotation speed of the drill string is less than a predetermined limit (2028). Page 35, lines 5-12. Claims 5-12 depend from claim 4.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Are claims 4-6 and 12 unpatentable under 35 U.S.C. § 103(a) as rendered obvious by the combination of U.S. Patent No. 5,883,015, issued to Hesse et al. and U.S. Patent No. 6,308,787, issued to Alft?

B. Are claims 7-11 unpatentable under 35 U.S.C. § 103(a) as rendered obvious by the combination of U.S. Patent No. 5,883,015, issued to Hesse et al. and U.S. Patent No. 6,308,787, issued to Alft, as put forth with respect to claim 4, and further in view of U.S. Patent No. 5,746,278, issued to Bischel et al.?

VII. ARGUMENT

(i) 35 U.S.C. § 112, First Paragraph Rejections.

This appeal concerns no § 112, first paragraph rejections.

(ii) 35 U.S.C. § 112, Second Paragraph Rejections.

This appeal concerns no § 112, second paragraph rejections.

(iii) 35 U.S.C. § 102 Rejections.

This appeal concerns no § 102 rejections.

(iv) 35 U.S.C. § 103 Rejections.

A. The combination of Hesse and Alft cannot support a *prima facie* showing of obviousness because they do not enable one skilled in the art to use the claimed method.

The Examiner rejected claims 4-6 and 12 under § 103(a), as being unpatentable over Hesse et al. (U.S. 5,833,015) in view of Alft (U.S. 6,308,787). Appellants submit that claims 4-6 and 12 are patentable over the cited prior art and the Examiner's rejection is without merit.

1. Summary of the Examiner's Rejections.

The Examiner rejected claims 4-6 and 12 under 35 U.S.C. § 103(a) as rendered obvious by U.S. Patent No. 5,833,015, issued to Hesse et al. ("Hesse") in view of U.S. Patent

No. 6,308,787 issued to Alft ("Alft"). Reversal of the § 103(a) rejection in view of Hesse and Alft is respectfully requested.

As the basis for these rejections, the Examiner has relied on Hesse in combination with Alft to support a claim of obviousness. To make a claim of obviousness, the Examiner has a burden of establishing a *prima facie* case of obviousness. M.P.E.P. 2142. To establish a *prima facie* case of obviousness, the prior art reference(s) must teach or suggest all of the claim limitations. M.P.E.P. 2143. However, the prior art references must also be enabling so that one skilled in the art can make and use the apparatus or method. See Beckman Instruments, Inc. v. LKB Produckter AB, 892 F.2d 1547, 1551, 13 U.S.P.Q.2d 1301, 1304 (Fed. Cir. 1989) and Ex Parte Ronald H. Nelson et al., 2000 WL 33534688 (Bd.Pat.App & Interf.). In the present case, the references relied upon by the Examiner do not enable one skilled in the art to make and use the apparatus or method. The Hesse patent does not disclose how to automatically reduce a length of the drill string, and Alft patent does not enable one of ordinary skill to do so. Thus, a *prima facie* case of obviousness as to claim 4 has not been made and the § 103(a) rejection must be overturned.

2. Appellants' Invention

Independent claim 4 is directed to a method for backreaming a horizontal borehole. The method comprises automatically rotating and pulling a drill string (22) having a backreamer through the horizontal borehole (2010). The method of claim 4 also comprises the step of automatically reducing a length of drill string (22). The method further comprises automatically reducing a rate of pullback (2012) if a rotation pressure on the drill string is greater than a predetermined limit (2014). Further still, the method comprises automatically reducing the rate of pullback (2026) if a rotation speed of the drill string is less than a predetermined limit (2028).

Accordingly, the preferred method of the present invention is directed to a horizontal directional drilling (hereinafter "HDD") backreaming operation. In a typical HDD

operation a pilot borehole is created by pushing a drill bit horizontally through the ground. The drill bit is supported at the end of a string of drill pipe sections. The drill string is generally made up of individual drill pipe sections connected end to end. As the drill bit is pushed through the ground, drill pipes are added, or "made up," one by one to extend the length of the drill string. The make-up operation consists of connecting the box joint of a pipe section to the pin joint of a similarly constructed drill pipe. When the drill bit reaches its destination point the pilot boring operation is completed and the backreaming operation may begin.

To begin the reaming operation, the operator removes the drill bit from the end of the drill string and connects a backreamer in its stead. The backreamer is pulled back through the borehole to enlarge the pilot bore for installation of a utility line or product pipe. Appellants' invention requires the operator to establish a predetermined rotation pressure limit and a predetermined rotation speed of the drill string for the backreaming operation. These limits are based upon factors such as soil composition, bend radius of the drill pipe, and elasticity of the utility line or product pipe being pulled into the borehole behind the backreamer.

After the limits for rotation pressure and speed have been established, automatic pullback and rotation of the drill string and backreamer through the horizontal borehole is started. As the drill string is pulled back through the borehole it becomes necessary to remove pipe sections from the drill string. Appellants' method automatically removes a length of drill pipe from the drill string without the need for operator intervention. Appellants' method also includes the steps of automatically reducing the rate of pullback if the rotation pressure on the drill string is greater than the predetermined limit; and automatically reducing the rate of pullback if the rotation speed of the drill string is less then the predetermined limit. Each step of Appellants' method is automatic and does not require operator intervention.

3. Hesse does not disclose automatically reducing a length of the drill string as required in Appellants' claim 4.

Hesse is directed to a system for monitoring the pulling force exerted on a product being pulled into the borehole behind a backreamer. Hesse teaches using the measurement of

tension force on a product pipe to control forward advance and rotational speed of the expansion drill bit. See Hesse, col. 4, ll. 18-22. Hesse also teaches that the tension force measurements can be used by an automatic control of drive (1) to control the advance and rotation speed of the drill bit. See id. at 23-25. However, as noted by the Examiner, Hesse does not teach automatically reducing the length of the drill string, as required by Appellants' claim 4. See Examiner's Action mailed November 19, 2007, at 4.

4. Alft does not teach how to automatically reduce the length of a drill string.

As discussed above, the Examiner recognized that Hesse does not teach automatically reducing a length of the drill string, and cited the Alft patent as teaching that missing feature. See Examiner's Action mailed November 19, 2007, at 4. However, Alft does not teach the feature and this does not enable one skilled in the art to automatically reduce a length of drill string.

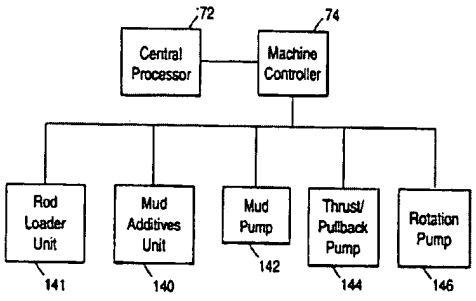

Fig. 7

The Alft patent describes an HDD system having a drilling machine, a drill string, a drive system, a plurality of sensors, and a central processor. With reference to Figure 7 of Alft, Alft teaches that a central processor (72) sends control signals to a machine controller (74) for automatic certain aspects of machine function. The machine controller (74) is operatively linked to a rod loader unit (141) purportedly used to control an automatic rod loader apparatus. With regard to the rod loader unit (141), Alft states only:

> A pipe loading controller 141 may be employed to control an automatic rod loader apparatus during rod threading and unthreading operations . . . .
>
> The machine controller 74 also controls rotation pump movement when threading a length of pipe onto a drill string 180, such as by use of an automatic rod loader apparatus of the type disclosed on

> commonly assigned U.S. Pat. No. 5,556,253, [the Rozendall Patent], which is hereby incorporated by reference in its entirety.

See Alft, col. 30, ll. 30-32 and 56-61. Alft's mere desire to automatically reduce a length of drill string does not make it enabling for such purpose and cannot render Appellants' claims obvious. Cardiac Pacemakers, Inc. v. St. Jude Medical, Inc., 381 F.3d 1371 (Fed. Cir. 2004) (recognition of a problem to be solved by a reference does not render the solution obvious).

Alft does not teach how to automatically reduce a length of drill string because it does not teach the sensors or control logic needed to process information from the sensors and activate the mechanical devices used to reduce a length of drill string. Alft's failure to teach how to reduce the length of the drill string is noticeably deficient, particularly when compared to the disclosure of other aspects of the Alft machine. For example, with regard to controlling thrust and pullback of the boring tool, Alft states:

> The thrust/pullback pump 144 depicted in FIG. 8 drives a hydraulic cylinder 154, or a hydraulic motor, which applies an axially directed force to a length of pipe 180 in either a forward or reverse axial direction. The thrust/pullback pump 144 provides varying levels of controlled force when thrusting a length of pipe 180 into the ground to create a borehole and when pulling back on the pipe length 180 when extracting the pipe 180 from the borehole during a back reaming operation. The rotation pump 146, which drives a rotation motor 164, provides varying levels of controlled rotation to a length of the pipe 180 as the pipe length 180 is thrust into a borehole when operating the boring machine in a drilling mode of operation, and for rotating the pipe length 180 when extracting the pipe 180 from the borehole when operating the boring machine in a back reaming mode. Sensors 152 and 162 monitor the pressure of the thrust/pullback pump 144 rotation pump 146, respectively.

See Alft, col. 30, lines 38-54. Notably, sensors and pumps are described to solve the thrust/pullback problem, but not for reducing the length of the drill string. Because Alft does not solve the problem of how to automatically reduce a length of drill string, one skilled in the art would not consult this reference.

The Rozendall Patent, incorporated by reference in Alft, does not cure the failings of Alft. Alft incorporated U.S. Patent No. 5,556,253, issued to Rozendall, by reference to teach

the use of a mechanical rod loader apparatus. Alft, col. 30, ll. 56-61. Rozendall is directed to an automatic pipe loading device (24) which includes a magazine (26) containing a plurality of pipes. See Rozendall, col. 2, ll. 48-50. Rozendall describes only the mechanical device used to load and unload pipes. Rozendall allows the operator to load pipe sections without requiring the operator to physically pick-up and load the pipe onto the machine. However, the operator still must operate levers and controls that assist the operator to perform the steps of loading the pipe. Rozendall does not describe a controller or automatic controls that automate the pipe-handling process so that the need for operator interaction is eliminated. Like Alft, one skilled in the art would not consult Rozendall to learn how to automatically reduce a length of the drill string.

Because the Examiner failed to provide a reference that one of skill in the art would consult to solve the problem of automatically reducing a length of drill string, the Examiner has failed to make a *prima facie* showing of obviousness. Consequently, the § 103(a) rejection of claim 4 must be overturned.

5. Claims 5, 6 and 12 are patentable over Hesse and Alft.

Claims 5, 6 and 12 all depend directly or indirectly from claim 4 and they should be allowed when claim 4 is allowed. Each of these dependent claims includes the patentable features of claim 4. As claim 4 has been demonstrated to be patentable over the combination of Hesse and Alft, then dependent claims 5, 6 and 12 are likewise patentable. Consequently, the § 103(a) rejection of claims 5, 6 and 12 must be overturned.

B. Claims 7-11 are patentable over the combination of Hesse, Alft, and Bischel.

The Examiner rejected claims 7-11 under 35 U.S.C. § 103(a) as unpatentable over the combination of Hesse, Alft, and Bischel. Withdrawal of this rejection is respectfully requested.

Claims 7-11 depend either directly or indirectly from independent claim 4. Claim 4 has been shown above to be patentable over the combination of Hesse and Alft because

neither reference discloses automatically reducing a length of drill string as required by Appellants' claim 4. Bischel does not supply the missing feature.

Bischel is directed to a method and apparatus for controlling the rate at which drilling fluid is pumped into the borehole to remove cutting and debris generated by the boring tool. The system in Bischel uses a rotation pump control 52 to maintain optimum rotation of the boring tool during the boring operation. During drilling or backreaming operations a rotation pump sensor monitors the pressure of the rotation pump and communicates rotation pump pressure information to a controller. In response to the rotation pump pressure information, the controller sends a signal to a displacement pump to either increase or reduce the rate of boring tool displacement.

A drilling fluid pump 58 may also form part of the boring system. The controller monitors the rate at which drilling fluid is pumped through the borehole and automatically adjusts the rate of displacement and/or the liquid flow rate so that sufficient liquid is flowing through the borehole in response to changes in the pressure readings of the rotation and displacement pumps. See Bischel, col. 4, line 37 – col. 5, line 21 and Abstract. Thus, Bischel is directed to an apparatus and method for automatically altering operation parameters of the boring machine in response to soil and rock loading parameters. There is no disclosure or teaching in Bischel of sensors or control logic needed to process information from the sensors to activate mechanical devices used to reduce a length of drill string. Rather, Bischel simply teaches a system for controlling boring tool rotation and displacement and drilling fluid flow rate. Accordingly, independent claim 4 is patentable over the combination of Hesse, Alft and Bischel.

Claims 7-11 all depend directly or indirectly from claim 4 and they should be allowed when claim 4 is allowed. Each of these dependent claims includes the patentable features of claim 4. As claim 4 has been demonstrated to be patentable over the combination of Hesse and Alft and Hesse, Alft and Bischel then dependent claims 7-11 are likewise patentable. Consequently, the § 103(a) rejection of claims 7-11 must be overturned.

(v) Other Rejections.

This appeal concerns no other rejections.

VIII. CONCLUSION

Appellants respectfully requests the Board overturn the rejections of claims 4-12, under 35 U.S.C. § 103(a), and that a notice of allowance be issued.

Respectfully submitted,

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Appendix 1

CLAIMS ON APPEAL

4. A method for backreaming a horizontal borehole, the method comprising:

automatically rotating and pulling a drill string having a backreamer through the horizontal borehole;

automatically reducing a length of the drill string;

automatically reducing a rate of pullback if a rotation pressure on the drill string is greater than a predetermined limit; and

automatically reducing the rate of pullback if a rotation speed of the drill string is less than a predetermined limit.

5. The method of claim 4 further comprising attaching a utility line to the backreamer.

6. The method of claim 5 further comprising automatically recording the actual location of the utility line as the utility line is automatically pulled through the borehole.

7. The method of claim 4 further comprising increasing the rate of pullback if the rotation pressure is less than the predetermined limit, the rotation speed of the drill string is greater than a predetermined limit, and the product tension at the backreamer is less than a predetermined limit.

8. The method of claim 7 wherein the rate of pullback is increased by five percent if the rotation pressure is less than the predetermined limit, the rotation speed of the drill string is greater than the predetermined limit, and the product tension at the backreamer is less than the predetermined limit.

9. The method of claim 4 wherein the rate of pullback is reduced by twenty percent if the rotation pressure is greater than the predetermined limit.

10. The method of claim 4 wherein the rate of pullback is reduced by ten percent if the rotation speed of the drill string is less than a predetermined limit.

11. The method of claim 4 further comprising automatically reducing a rate of pullback if the rotation speed of the drill string is within a predetermined range and a product tension at the backreamer is greater than a predetermined limit.

12. The method of claim 4 wherein the step of automatically reducing a length of the drill string comprises automatically removing a pipe section from the drill string.

Appendix 2

EVIDENCE

5 No additional evidence is being submitted.

Appendix 3

RELATED PROCEEDINGS

There are no related proceedings.